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Nature versus Nurture

By Joshua Lederberg

WHICH IS MORE important for human development, heredity or environment? This question about "nature versus nurture" is the one most often asked of the human geneticist. It is far too crudely stated to be of much value in unifying the scientific understanding of man, but we must find some way of dealing with it—if only because it is so often asked.

Before we can attempt to appraise the scientific evidence, we have to clarify the question. Then we can consider ways to answer it. Both steps involve treacherous confusion.

By taking extreme examples, it is easy to prove either side of the issue. Men are almost always more resourceful than monkeys. The essential difference between man and monkey is heredity—the chemistry of DNA molecules. Monkeys reared in the most stimulating environment never approach human intelligence.

But it must be pointed out that much of the difference—the culture that includes language, agriculture, social organization, industrial skills—comes from the environment that man has created. It is possible that only a small enlargement of the monkey's brain, to facilitate its speech, is all that stands between it and the emergence of new cultures analogous to the human.

IN OTHER circumstances, environment may be the overriding factor. A fetus of impeccable genetic quality may be so impaired by a prenatal attack by German measles virus that it cannot survive, or if it does and continues its distorted development, it may have lost too many brain cells to have any hope of expressing the promise of its DNA.

Science and Man

Man versus monkey, or brain-damaged versus healthy, are extreme examples of hereditary and environmental differentials, but the same principles apply to the infinite gradation of subtler differences in human heredity and experience.

The nature-nurture issue has no universal answer; it must be looked at existentially. If we see differences in performance within a group of people, or between groups, we can ask a specific question about that group. Of the total observed variability in IQ, income or education in a group, what fraction can we attribute to variations in heredity and what fraction to variations in environment?

If we also take into account the interactions between the two terms, the fractions must total 100 percent. Thus, we could standardize the environment of a given group and then all of its variability would have to be genetic. If we standardized the genetics—for example, by dealing with identical twins—the observed variability would have to be environmental.

If environment and heredity are both variable, as is almost always the case in human affairs, we also have to consider whether the two are optimally matched.

THE NATURE-NURTURE issue has been raised in the most pointed fashion in connection with race. The performance of Negroes in academic and economic competition in the United States is an urgent social problem. Sensibleness tells us we must concentrate on individual performance, not group labels.

Nevertheless, it has been asserted that we ought to narrow our expectation for the ultimate catchup of minority races because they might have some hereditary limitation.

We are not very knowledgeable about how to identify the most crucial factors in nurturing the intellectual and social development of a child. However, one would have to be studiously blind not to see an ample explanation of racial lag in the existing discriminatory environment.

But, the retort goes, it is well known that a large part of the differences in intelligence are hereditary; therefore the minority groups must, to the same extent, be genetically inferior. This is the fraud of translating measurements in one homogeneous group to predictions about inter-racial differences.

Until the environments are made comparable, or until the whole process of the development of intellect is scientifically well-understood, we have no way to draw any conclusions whatever about the nature of racial difference.

Fortunately, we are committed by law, and by our confrontation with conscience and reality, to make the experiment; to find out how far human performance can be liberated by removing the burden of discrimination.

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